BULLETIN

OF THE

OHIO AGRICULTURAL EXPERIMENT STATION.

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ARTICLE I.—EXPERIMENTS WITH POTATOES.

1. COMPARISON OF VARIETIES.

The soil selected for potatoes at the Station was a clay loam that had been well enriched by applications of stable manure and chemical fertilizers in previous seasons. The potatoes were planted early, which is essential to success in this locality. Two-eye cuttings were used. On account of the blight, which affected all varieties more or less, it was difficult to determine comparative earliness with any degree of accuracy; hence, no date of ripening is given. The season was quite favorable, and a fine crop was obtained. The early varieties had nearly finished their growth before they became seriously affected by the blight, while the late and medium sorts suffered considerably. This explains the comparatively high rate of yield of the early varieties. Table I. includes the varieties that are of the greatest interest at present, many of the old sorts and the new ones sent for trial being omitted.

Comparing early varieties with each other, we find that Crown Jewel, Puritan, Queen (New Queen), Nott (Nott's Victor), Everitt, Early King and Oxford gave the highest yields, while Ohio Junior, Polaris, Stray Beauty, White Early Ohio, Chas. Downing and Early Ohio gave the lowest. This is a comparison of extremes, and several early varieties can not be ranked in either class. Although not ranking in the same order as in 1888, these varieties fall in the same classes both seasons. From repeated trials at the Station it seems safe to class Crown Jewel, Puritan, Queen and Oxford as the most productive and reliable of the early varieties, while Ohio Junior, Early Ohio, Stray Beauty and Chas. Downing are among the least productive. Varieties not fully tested are omitted in this estimate, also some others that rank high but fall a little below the average of the best. The majority of early varieties must be classed as moderately productive.

POTATOES.—TABLE I.—Comparison of Varieties Grown at the Station.

Name of variety.	Rate of yield, bushels per acre.	Season of ripening.	Character of growth.
Albino (Early Albino)	322	Early	Strong.
Bonanza	287	"	"
Burbank	198	Medium	"
Ben Harrison	269	"	Very strong.
Badger State Peachblow	273	"	"
Chas. Downing	226	Early	Medium.
Crown Jewel	462	"	Strong.
Dandy	327	Medium	Very strong.
Delaware	288	"	"
Dakota (Dakota seedling)	145	"	"
Early Ohio	200	Very early	Medium.
Early King	346	Early	Strong.
Essex (Early Essex)	332	"	"
Everitt	384	"	"
Empire State	389	Medium	Very strong.
Early Hebron (Early Beauty of Hebron)	305	Early	Strong.
Fearnaught	263	"	Very strong.
Field Pride (Pride of the Field)	379	Medium	"
Lee Favorite (Lee's Favorite)	314	Early	Strong.
Minister	295	"	"
Monroe Prize (Monroe Co. Prize)	302	Medium	"
Minnesota Early (Early Minnesota)	292	Early	"
North Pole (Child's North Pole)	315	"	Medium.
Northern Spy (Boley's Northern Spy)	222	Medium	Strong.
Nott (Nott's Victor)	389	Early	"
New Zealand Early (Early New Zealand)	248	"	Medium.
Oxford (Early Oxford)	345	"	Very strong.
Ohio Fancy	234	Medium	"
Ohio Junior	289	Very early	Medium.
Pearl (Early Pearl)	314	Early	Strong.
Table Pride (Pride of the Table)	308	Medium	Very strong.
Puritan Early	425	Early	Strong.
Polaris	280	"	Medium.
Pootatuck	352	"	"
Perfect Peachblow	245	Medium	Very strong.
Rural New Yorker	324	"	"
Red Giant (Read's Red Giant)	362	"	"
Roger (Roger's Seedling)	382	Early	Strong.
Queen (New Queen)	399	"	"
Summit	418	Medium	Very strong.
Sunlit Star	275	Early	Strong.
Standard Early (Early Standard)	325	"	"
Stray Beauty	237	Very early	Medium.
Superior (Burpee's Superior)	328	Medium	Very strong.
Seneca Beauty	228	"	Strong.
Table Pride (Pride of the Table)	308	"	Very strong.
White Early Ohio	272	Early	Medium.
White Elephant	498	Medium	Very strong.

Of medium varieties, those that rank highest as to productiveness are: Summit, Empire State, Superior (Burpee's Superior), White Elephant and Rural New Yorker, while those of the other extreme are Northern Spy (Boley's Northern Spy), Perfect Peachblow and possibly Monroe Prize. Those that remain unclassified are ranked as medium or moderately productive. It is hardly probable that any of the unclassified should be placed in the first class, but further trial may change all these lists somewhat.

Several lots of potatoes were sent to different parts of the State for trial. Reports have not been received from all, and in some the data were insufficient and the reports had to be rejected, but the remaining ones furnish valuable material for comparison. No yields were reported equal to those obtained at the Station, but this fact detracts nothing from the value of the comparisons made, but enhances it rather. The yields at the Station are placed alongside those from other sections, not for the purpose of showing where the largest yields were obtained, but in order to compare the relative standing of varieties. A high or low rate of yield of any variety for one locality teaches nothing, unless comparisons are made with other varieties. The highest number of varieties was sent to Mr. Wilson Dresbach, of Pickaway county, but those only that are of most interest to the public are given in the report.

REPORT FROM W. DRESBACH, PICKAWAY COUNTY.

Soil, clay loam; natural drainage, good; clover sod, plowed in the spring; fertilizer, light dressing of superphosphate; potatoes cut to two eyes and planted in drills 1x3 feet apart; level cultivation given.

There are some apparent discrepancies in the results obtained by Mr. Dresbach and at the Station, but these disappear when the early and medium varieties are considered separately. At Mr. Dresbach's the early varieties gave comparatively low, while the medium gave high yields. At the Station this order was reversed. This may be explained by the dissimilar action of the blight in the two localities. Comparing the early varieties, the Oxford, Puritan, Everitt and Minnesota Early rank high; agreeing in part with the results obtained at the Station, while Ohio Junior, Stray Beauty and White Early Ohio stand at the foot in both lists. Of the medium varieties, Summit, Rural New Yorker, Empire State, Delaware and Seneca Beauty are at the head of the list, while Northern Spy and Monroe Prize fall but little below the others, which is not wholly in accord with the results at the Station. Averaging the yields for both localities leaves the lists of the best and poorest varieties substantially the same as those given for the Station.

POTATOES—TABLE II—Comparison of Varieties, by W. Dresbach.

Name of Variety.	Rate of yield, bushels per acre.		
	At Mr. Dresbach's.	At the Station.	Average.
Albino (Early Albino)	154	322	238
Charles Downing	147	226	186
Crown Jewel	140	462	301
Delaware	272	288	280
Everitt	210	384	297
Empire State	280	389	334
Lee Favorite (Lee's Favorite)	120	314	217
Monroe Prize (Monroe Co. Prize)	223	302	262
Minnesota Early (Early Minnesota)	207	292	249
Northern Spy (Boley's Northern Spy)	224	222	223
New Zealand Early (Early New Zealand)	118	248	183
Oxford (Early Oxford)	280	345	312
Ohio Junior	121	289	205
Puritan Early	196	425	310
Rural New Yorker	280	324	302
Sunlit Star	150	275	212
Stray Beauty	104	237	170
Superior (Burpee's Superior)	223	328	275
Seneca Beauty	300	228	264
Summit	232	418	325
White Ohio Early	112	272	192

REPORT FROM BENJ. H. BROWN, BUTLER COUNTY.

Character of soil and method of cultivation not given.

POTATOES—TABLE III—Comparison of Varieties by Benj. H. Brown.

Name of variety.	Rate of yield—bushels per acre.		
	At Mr. Brown's.	At the Station.	Average.
Albino (Early Albino)	87	322	204
Crown Jewel	273	462	367
Delaware	208	288	248
Ohio Junior	102	289	195
Oxford (Early Oxford)	235	345	290
Puritan Early	220	425	322
Seneca Beauty	240	228	234
Summit	240	418	329

The results obtained by Mr. Brown agree with those at the Station in placing Crown Jewel, Oxford, Puritan and Summit at the head of the list of productive varieties, while Ohio Junior and Albino stand at the foot. In one particular his results vary from our own, viz.: in the high yield of Seneca Beauty. Mr. Brown regards it as one of the best varieties tested.

REPORT FROM FRED. PATTON, HARRISON COUNTY.

Soil, black sandy loam, with a heavy subsoil; previous crops, timothy, followed by sugar beets; fertilizer, 350 lbs. superphosphate per acre; planted 2x3 feet apart, two pieces to the hill; ridge culture, with Planet Junior cultivator.

POTATOES—TABLE IV—COMPARISON OF VARIETIES BY FRED. PATTON.

Name of varieties.	Rate of yield—bushels per acre.		
	At Mr. Patton's.	At the Station.	Average.
Albino (Early Albino)	88	322	205
Crown Jewel	96	462	276
Delaware	149	288	218
Ohio Junior	62	289	175
Oxford (Early Oxford)	185	345	265
Puritan Early	131	425	278
Seneca Beauty	190	228	209
Summit	173	418	295

The above results agree substantially with those obtained by Mr. Brown, and differ from those of the Station in the high rate of yield of Seneca Beauty, and comparatively low rate of Crown Jewel.

REPORT FROM M. E. EIDMILLER, MIAMI COUNTY.

Soil, sandy loam, with good natural drainage; previous crop, clover; fertilizer, 300 lbs. Bowker superphosphate per acre; potatoes planted 16 inches by 3½ feet; level cultivation given.

This report is quite at variance with the others in regard to the relative positions of Crown Jewel and Ohio Junior. Puritan and Oxford retain the same place among early varieties as before, while Seneca Beauty and Delaware take the highest place among the medium varieties, and Summit stands comparatively low. The character of the soil being different from that of the other localities may have had the effects above noted.

POTATOES—TABLE V—COPMARISON OF VARIETIES BY M. E. EIDMILLER.

Name of varieties.	Rate of yield—bushels per acre.		
	At Mr. Eidmiller's.	At the Station.	Average.
Albino (Early Albino)	92	322	207
Crown Jewel	88	462	275
Delaware	171	288	229
Ohio Junior	126	289	207
Oxford (Early Oxford)	158	345	251
Puritan Early	138	425	281
Seneca Beauty	167	228	197
Summit	101	418	259

POTATOES—TABLE VI—COMPARISON OF VARIETIES TESTED IN FIVE DIFFERENT LOCALITIES.

Name of variety.	Rate of yield—bushels per acre.		
	Highest yield.	Lowest yield.	Average.
Albino (Early Albino)	322	87	149
Crown Jewel	462	88	210
Delaware	288	171	218
Ohio Junior	289	62	140
Oxford (Early Oxford)	345	155	241
Puritan Early	425	131	222
Seneca Beauty	300	167	225
Summit	418	100	233

Oxford and Puritan Early stand at the head of the list of early varieties, while Ohio Junior and Albino are at the foot. The medium varieties, Summit, Seneca Beauty and Delaware rank about alike. One point is worthy of note in reference to Seneca Beauty, Oxford and Delaware, viz.: the comparatively small range of variation in yield in different localities, showing adaptability to varying soils and conditions. This is a valuable feature, and any variety that possesses it must be ranked high, even though it never gives phenomenal yields. Variable varieties are unreliable even in localities where they seem to be best adapted. So far as comparison can be made, the results in 1888 and 1889 agree very closely Those that stood at either extreme in 1888 take the same place in 1889

SUMMARY.

From the results of eight trials in 1888 and five in 1889, thirteen in all, and made in eleven different localities, the following conclusions may be drawn:

The most productive of the early varieties are Oxford, Puritan Early and Crown Jewel. Next in order stand Nott and Lee Favorite. Of the medium and late sorts Empire State, Summit, Seneca Beauty, White Elephant and Delaware rank the highest of those that are fully tested. Including early, medium and late varieties, not fully tested, those that are the most promising are Queen (New Queen), Rural New Yorker, Superior (Burpee's Superior) and Minnesota Early. Early Ohio, Ohio Junior and Stray Beauty rank as the earliest, but are unproductive. Albino and Chas. Downing seem to be less reliable than formerly, probably owing to susceptibility to blight. Northern Spy and Monroe Prize are inferior in appearance, hence not valuable for market. The former is unproductive, and it is not probable that the latter will rank very high in this respect. Oxford, Seneca Beauty and Delaware show comparatively little variation on different kinds of soil.

2—TRIAL OF FERTILIZERS.

In 1888 a field of three acres was laid off in plots of one-twentieth of an acre each, for the purpose of testing fertilizers on potatoes. The plan is as follows:

Plot No.	1	received	no fertilizer.
"	2	"	10 pounds Acid Phosphate (dissolved S. C. rock).
"	3	"	13 " Thomas Slag.
"	4	"	no fertilizer.
"	5	"	16 pounds Superphosphate (dissolved bone black).
"	6	"	8 " Nitrate of Soda.
"	7	"	no fertilizer.
"	8	"	16 pounds Sulphate of Potash.
"	9	"	800 pounds barnyard manure.
"	10	"	no fertilizer.
"	11	"	8 pounds Nitrate of Soda. 16 " Sulphate of Potash. 16 " Superphosphate.
"	12	"	no fertilizer.

The above work was carried on in duplicate series in 1888 and 1889. The soil of the field selected was considerably worn, and a light yield was to be expected, but the blight nearly destroyed the crop both seasons, rendering the results very unsatisfactory. Although untrustworthy in the main, the results have some value for the following reasons:

1. Phosphoric acid increased the crop by more than 80 per cent. and to about an equal extent in the three forms, viz. superphosphate, acid phosphate and Thomas slag. The value of Thomas slag has been estimated at about one-half that of superphosphate, for the first season, but the results obtained here indicate that it may have a higher value than this for potatoes. Its cost is less than one-half that of superphosphate, hence its profitable use on potatoes is not a questionable matter, where a phosphatic fertilizer is required.

2. Nitrate of soda seemed to have an injurious effect, whether applied singly or in combination. In former seasons it had no beneficial effect, but during the last two seasons, and especially in 1889, when the blight was the most destructive, all the plots where nitrate of soda alone was applied gave much smaller yields than the adjacent unfertilized plots. The reason for this is not plain, but it is possible that nitrate of soda favors the development of the blight and at the same time delays the period of ripening.

SUMMARY.

The following conclusions are drawn from results obtained with fertilizers on potatoes, during the entire period that the work has been carried on at the Station. The work has been conducted on several different classes of soil, including tests made in one other section, hence it is believed that fairly representative results have been obtained. It is not possible to secure the same results upon different soils, nor upon any given soil in consecutive seasons, in a trial of fertilizers, but sufficient uniformity is seen in the results to warrant the conclusions given. If the potato grower errs in taking these results as a basis of action, it will be on the conservative side. There is more in the results to teach what not to do than otherwise, but they also give suggestions as to possible use of commercial fertilizers in a profitable manner.

1st. Sulphate of potash and muriate of potash have in some instances increased the yield, but in no case sufficiently to make their use profitable.

2d. Nitrate of soda and sulphate of ammonia have in a few cases given a slight increase in yield, but not to a profitable degree.

In seasons when blight has been the most severe these substances, especially the former, have apparently exerted an injurious effect.

3d. Superphosphate (dissolved bone black), acid phosphate and Thomas slag have in nearly all cases increased the yield. Thomas slag is the cheapest form in which phosphoric acid can be obtained, and the trials indicate that its use on potatoes is likely to be attended with greater profit than that of either of the other substances named.

4th. A mixture of sulphate of potash, superphosphate and nitrate of soda has usually given better results than superphosphate alone, but not always.

5th. Barnyard manure has increased the yield, but not always the total marketable product, because of the usual prevalence of scab where this fertilizer is used.

6th. In no case has the potato crop been benefited, to a profitable degreee, by the application of fertilizers, of any kind, on soil that was already in a high state of fertility.

7th. On soil that had been worn by previous cropping, phosphatic fertilizers, the so-called complete chemical fertilizers and barnyard manure have in nearly all cases given profitable returns.

8th. The rational conclusion is that since the potato requires a soil that is in a high state of fertility, and since the direct application of fertilizers to the crop is attended with considerable uncertainty, the most feasible method is to bring the soil up to the proper condition by enriching the land for previous crops. The best crop of potatoes that has been grown at the Station succeeded a crop of cabbage that had been heavily manured. The most approved practice is to grow potatoes after clover, fertilizing both the clover and preceding crop.

In a bulletin issued by the Department of Agriculture on the Results of Field Experiments with Various Fertilizers, Prof. W. O. Atwater gives the following conclusions regarding fertilizers used on potatoes: "Nitrate of soda was most effective where used in connection with other materials on potatoes. Alone on potatoes, it was generally unprofitable, though in a few cases the results were very striking.

"Superphosphate has proved profitable for potatoes in every case where bad weather and other untoward circumstances did not interfere. It has been the most useful on the poorer and medium soils.

"Muriate of potash proved profitable with potatoes in nearly every case where not interfered with by bad weather or other disturbing causes. It is noticable that in cases of drought, or where the fertilizers were applied in the hill or drill, both muriate of potash and nitrate of soda were often injurious."

3—CUTTING OF SEED.

Experiments in cutting of seed potatoes, after various methods, have been carried on each season since the organization of the Station. In 1889 the work was carried on upon a larger scale han formerly and with a greater number of varieties, the object being to test the validity of conclusions drawn from the results of former experiments, also to compare

varieties. There is sufficient uniformity in the results of different seasons to warrant the following conclusions:

1. Other conditions being the same, the larger the cutting the greater the total product, i. e., the total product varies in about the same ratio as the size of the cutting.

2. The marketable product also increases as the size of the cutting is increased, but does not follow the same ratio as the total product; the rate of gain being less.

3. The increase is found in both the large and small potatoes, the greater portion being in the latter.

4. A crop grown from whole potatoes matures at an earlier date than from small cuttings.

5. Small cuttings require soil that is more highly enriched and thoroughly prepared than large cuttings and whole potatoes, in order to secure a good stand and to produce a profitable crop.

6. The question of relative profit, as between the use of small cuttings and whole potatoes, depends upon the cost of seed potatoes, the date at which the crop is to be harvested and sold, and the condition of the soil at planting time.

7. In ordinary practice it will usually be found that neither extreme, as to quantity of seed used, will be found to be profitable. The safest plan is to use large, well-matured, healthy potatoes, and cut to two and three eyes.

W. J. GREEN,
Horticulturist.

ADDENDUM.

THE TESTING OF VARIETIES OF FRUITS AND VEGETABLES.

The following announcement, published in previous numbers of the Bulletin of this Station, is repeated for the benefit of those who may not have received those numbers:

The testing of varieties of fruits and vegetables is an important part of the horticultural work of the Station, and is so conducted as to be of service to originators and to the general public. Varieties are received from originators, and reports given to the owners from time to time, whenever desired. These partial reports are made public at the discretion of the Station, but are usually withheld until the variety is offered for sale, and in case it is not thought worthy of introduction by the owner, no public report is made. Thus originators are aided in testing their productions, while the public has the advantage of early knowledge concerning new varieties, and is not burdened with reports of varieties that are unworthy of dissemination. Varieties that are sent for trial are not propagated beyond the requirements of experimentation, nor are plants, cuttings or scions of such varieties offered for sale, nor given away or exchanged, *without consent of the owners*, but no responsibility will be assumed in case of theft, beyond a reasonable diligence to prevent it.

As far as possible, all varieties are subjected to the same conditions, and no agreement will be entered into to give special treatment in any case.

Varieties are not desired unless they are thought to have special merit. The Station cannot undertake to test long lists of seedlings, for the simple purpose of sifting out the undesirable varieties for the benefit of individuals. Unless a variety is likely to be disseminated, and thus become of public interest, it is not wanted, although no variety will be refused that is sent in good faith.

In addition to the testing of varieties, strains of varieties from different sources, have been compared in case of vegetables. This work promises even greater usefulness than the testing of varieties proper. For this reason the Station is especially desirous of obtaining improved strains of varieties from commercial and private seed-growers. Samples of this kind will receive careful attention and given a thorough trial.

Care should be taken, in sending new varieties, to label the packages distinctly with the name or number of variety, and name of sender, together with postoffice address. A letter or card should be sent at the same time, giving full particulars as to origin and parentage, if known, and of such other facts as may be of interest.

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